*Red Hat Enterprise Linux 3*

# Installation Guide for the IBM® S/390® and IBM® eServer™ zSeries® Architectures

**Red Hat Enterprise Linux 3: Installation Guide for the IBM® S/390® and IBM® eServer™ zSeries® Architectures**

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# Introduction

Welcome to the *Red Hat Enterprise Linux Installation Guide*. This guide contains useful information to assist you during the installation of Red Hat Enterprise Linux 3. From fundamental concepts such as installation preparation to the step-by-step installation procedure, this book will be a valuable resource as you install Red Hat Enterprise Linux.

## 1. Document Conventions

When you read this manual, certain words are represented in different fonts, typefaces, sizes, and weights. This highlighting is systematic; different words are represented in the same style to indicate their inclusion in a specific category. The types of words that are represented this way include the following:

`command`

Linux commands (and other operating system commands, when used) are represented this way. This style should indicate to you that you can type the word or phrase on the command line and press [Enter] to invoke a command. Sometimes a command contains words that would be displayed in a different style on their own (such as file names). In these cases, they are considered to be part of the command, so the entire phrase is displayed as a command. For example:

Use the `cat testfile` command to view the contents of a file, named `testfile`, in the current working directory.

`file name`

File names, directory names, paths, and RPM package names are represented this way. This style should indicate that a particular file or directory exists by that name on your system. Examples:

The `.bashrc` file in your home directory contains bash shell definitions and aliases for your own use.

The `/etc/fstab` file contains information about different system devices and file systems.

Install the `webalizer` RPM if you want to use a Web server log file analysis program.

**application**

This style indicates that the program is an end-user application (as opposed to system software). For example:

Use **Mozilla** to browse the Web.

[key]

A key on the keyboard is shown in this style. For example:

To use [Tab] completion, type in a character and then press the [Tab] key. Your terminal displays the list of files in the directory that start with that letter.

[key]-[combination]

A combination of keystrokes is represented in this way. For example:

The [Ctrl]-[Alt]-[Backspace] key combination exits your graphical session and return you to the graphical login screen or the console.

**text found on a GUI interface**

A title, word, or phrase found on a GUI interface screen or window is shown in this style. Text shown in this style is being used to identify a particular GUI screen or an element on a GUI screen (such as text associated with a checkbox or field). Example:

Select the **Require Password** checkbox if you would like your screensaver to require a password before stopping.

**top level of a menu on a GUI screen or window**

A word in this style indicates that the word is the top level of a pulldown menu. If you click on the word on the GUI screen, the rest of the menu should appear. For example:

Under **File** on a GNOME terminal, the **New Tab** option allows you to open multiple shell prompts in the same window.

If you need to type in a sequence of commands from a GUI menu, they are shown like the following example:

Go to **Main Menu Button** (on the Panel) => **Programming** => **Emacs** to start the **Emacs** text editor.

**button on a GUI screen or window**

This style indicates that the text can be found on a clickable button on a GUI screen. For example:

Click on the **Back** button to return to the webpage you last viewed.

`computer output`

Text in this style indicates text displayed to a shell prompt such as error messages and responses to commands. For example:

The `ls` command displays the contents of a directory. For example:

```
Desktop                about.html       logs           paulwesterberg.png
Mail                   backupfiles      mail           reports
```

The output returned in response to the command (in this case, the contents of the directory) is shown in this style.

`prompt`

A prompt, which is a computer's way of signifying that it is ready for you to input something, is shown in this style. Examples:

```
$
```

```
#
```

```
[stephen@maturin stephen]$
```

```
leopard login:
```

**`user input`**

Text that the user has to type, either on the command line, or into a text box on a GUI screen, is displayed in this style. In the following example, **`text`** is displayed in this style:

To boot your system into the text based installation program, you must type in the **`text`** command at the `boot:` prompt.

*`replaceable`*

Text used for examples which is meant to be replaced with data provided by the user is displayed in this style. In the following example, *<version-number>* is displayed in this style:

The directory for the kernel source is `/usr/src/<version-number>/`, where `<version-number>` is the version of the kernel installed on this system.

Additionally, we use several different strategies to draw your attention to certain pieces of information. In order of how critical the information is to your system, these items are marked as note, tip, important, caution, or a warning. For example:

**Note**

Remember that Linux is case sensitive. In other words, a rose is not a ROSE is not a rOsE.

**Tip**

The directory `/usr/share/doc/` contains additional documentation for packages installed on your system.

**Important**

If you modify the DHCP configuration file, the changes will not take effect until you restart the DHCP daemon.

**Caution**

Do not perform routine tasks as root — use a regular user account unless you need to use the root account for system administration tasks.

**Warning**

Be careful to remove only the necessary Red Hat Enterprise Linux partitions. Removing other partitions could result in data loss or a corrupted system environment.

## 2. How to Use This Manual

This manual focuses on a VM and LPAR-based installation and is ideal for users (both new and old) who want a quick and simple installation solution. It helps you prepare your system and walk you through the installation of Red Hat Enterprise Linux.

If you are an experienced user and you do not need a review of the basics, you can skip ahead to Chapter 2 *Installing Red Hat Enterprise Linux* to begin the installation process.

### 2.1. We Need Feedback!

If you discover a typo in the *Red Hat Enterprise Linux Installation Guide* or have thought of a way to make this manual better, we would love to hear from you. Submit a bug report against the component rhel-ig-s390-multi in Bugzilla at:

`http://bugzilla.redhat.com/bugzilla/`

When submitting a bug report, be sure to mention the manual's identifier:

`rhel-ig-s390-multi(EN)-3-Print-RHI (2003-07-25T17:10)`

If you have a suggestion for improving the documentation, try to be as specific as possible when describing it. If you have found an error, please include the section number and some of the surrounding text so we can find it easily.

If you have a support question (for example, if you need help configuring X, or if you are not sure how to partition your hard drive[s]), use the online support system by registering your product at:

`http://www.redhat.com/apps/activate/`

## 3. Accessibility Solutions

While the graphic user interface (GUI) is convenient for sighted users, it is often inhibiting to those with visual impairments because of the difficulty speech synthesizers have interpreting graphics. Red Hat Enterprise Linux is an ideal operating system for users with visual limitations because the GUI is not required by the kernel. Most modern tools including email, news, Web browsers, calendars, calculators, and much more can run on Linux without a graphical environment. The working environment can also be customized to meet the hardware or software needs of the user.

Red Hat, Inc. is the distribution of choice for people with special needs because of the outstanding support that is offered with the purchase of any boxed set. Many Linux distributions provide limited or nonexistent support to customers. Red Hat's installation support is deliverable via email or via the telephone and special circumstances will be considered and addressed for users with physical limitations. Customers should inform the support technician if they require specialized support.

For more information, refer to:

- http://www.tldp.org/HOWTO/Accessibility-HOWTO/
- http://www.tldp.org/HOWTO/Keyboard-and-Console-HOWTO.html
- The `README-Accessibility` file provides more information and instructions for using some of the tools available for users with special needs. This file can be found in `/usr/share/doc/redhat-release-`*`X`*`/`, where *`X`* is the release number of your installed product.

# Chapter 1.

# Steps to Get You Started

The installation process assumes basic familarity with the IBM S/390 and IBM eServer zSeries platform and makes reference to the *IBM Linux for S/390 Redbook* (SG24-4987-00 and SG24-6264-00) guide (refer to http://www.redbooks.ibm.com/ for more information). In general, this section assumes that you have reviewed the *Redbook* and are familiar with setting up logical partitions (LPARs) and virtual machines (VMs) on an S/390 system.

**Note**

For the most current IBM resources, visit http://www.ibm.com/eserver/zseries/.

Before you install Red Hat Enterprise Linux, you must to perform the following steps:

1. Allocate sufficient *DASD*[1] partitions to provide suitable disk space (for example, 2 GB is sufficient for server installations, while 5 GB is minimally required to install all packages).
2. Acquire a minimum of 256 MB RAM (512 MB is strongly recommended) to designate for the Linux virtual machine.
3. Determine if you need swap space and if so how much. While it is possible (and recommended) to assign enough memory to the VM and let the VM do the necessary swapping, there may be cases where the amount of required RAM is not predictable. Such instances should be examined on a case-by-case basis.
4. Decide what environment under which to run the Red Hat Enterprise Linux operating system (on an LPAR or as a guest operating system on one or more virtual machines).
5. Finally, it is important to review sections 3.3 through 3.8, and Chapters 5 and 6 of the *IBM Linux for S/390 Redbook*, as it explains the different configurations and install scenarios available on the S/390 platform as well as how to setup an initial LPAR or Linux virtual machine (VM).

## 1.1. Additional S/390 Hardware Preparation for Installation Notes

The network configuration must be determined beforehand. Red Hat Enterprise Linux for S/390 supports multiple network devices including CTC, IUCV, LCS, and QDIO-enabled devices. For the purposes of this installation, it is recommended that two 2 GB DASD partitions be allocated for the installation process. All DASD disk allocations should be completed prior to the install process. After the installation, more DASD disk partitions may be added or deleted as necessary.

## 1.2. Basic Overview of the Boot Method

For installation you must start a kernel (with the Linux kernel), an `initrd.img`, and a `parameter` file with some information about your network configuration. Once this is started on the S/390, the networking is configured. You can then use **telnet** or **ssh** on another computer to log into your Red Hat Enterprise Linux install image and start an installation script to install Red Hat Enterprise Linux.

1. Direct Access Storage Devices (or DASDs) are hard disks that allow a maximum of three (3) partitions per DASD. For example, `dasda` has `dasda[123]`.

## 1.3. Preparing for a Network Installation

The Red Hat Enterprise Linux installation media must be available for either a network installation (via NFS, FTP, or HTTP) or installation via local storage. Use the following steps if you are performing an NFS, FTP, or HTTP installation.

The NFS, FTP, or HTTP server to be used for installation over the network must be a seperate machine which can provide the complete `RedHat/` directory. Both the `RedHat/base/` and `RedHat/RPMS/` directories must be available and populated with all files from all installation CD-ROMs.

**Note**

The directory specified in the following refers to */location/of/disk/space/*. This means it is the directory up to, but *not* including, the `RedHat/` distribution directory. For example, if you have Red Hat Enterprise Linux 3 installation files located in `/export/redhat/` on the installation staging server, */location/of/disk/space/* would be `/export/redhat/`.

To copy the `RedHat/` directory from the installation CD-ROMs to a Linux machine which acts as an installation staging server, perform the following steps:

- For each binary CD-ROM, execute the following commands:
  - `mount /mnt/cdrom`
  - `cp -var /mnt/cdrom/RedHat /location/of/disk/space`

    where */location/of/disk/space/* is a directory you create such as `/export/redhat/`
  - `umount /mnt/cdrom/`

- Note that the Release Notes are not included in the `RedHat` directory. Unless they are specifically copied over, the Release Notes will not be available during your installation of Red Hat Enterprise Linux. The Release Notes are formatted in HTML files located at the root of the disc. Copy the files to your installation directory. For example:

  `cp /mnt/cdrom/RELEASE-NOTES*.html /location/of/disk/space/`

  The Release Notes are also available online from http://www.redhat.com/docs/.
- Next, make */location/of/disk/space/* accessible to the installation program via NFS, FTP, or HTTP and verify access from a client.
- For NFS, export the directory by adding an entry to `/etc/exports` to export to a specific system:
  `/location/of/disk/space client.ip.address(ro,no_root_squash)`

  To export to all machines (not appropriate for all NFS systems), add:
  `/location/of/disk/space *(ro,no_root_squash)`

  Start the NFS daemon (on a Red Hat Enterprise Linux machine, use `/sbin/service nfs start`). If NFS is already running, reload the configuration file (on a Red Hat Enterprise Linux system, use `/usr/bin/service nfs reload`).

  Be sure to test the NFS share following the directions in the *Red Hat Enterprise Linux System Administration Guide*.

  If the `RedHat/` directory does not appear in the NFS shared directory, the wrong path may have been mounted and/or exported.

- FTP and HTTP installations also support a second type of tree structure. To make it easier to access the contents of the installation CD-ROMs, mount each CD-ROM or ISO image with the following mount point on the FTP or HTTP server (where *X* is the number of the CD-ROM or ISO image):
  `/location/of/disk/space/discX/`

  For example:
  `mount -o loop CD1.iso /location/of/disk/space/disc1/`

### 1.3.1. Using ISO Images for NFS Installs

NFS installations can use ISO (or CD-ROM) images rather than copying an entire installation tree. After placing the required ISO images (the binary Red Hat Enterprise Linux CD-ROMs) in a directory, choose to install via NFS. You will then point the installation program at that directory to perform the installation.

Verifying that the ISO images are intact before you attempt an installation will help to avoid problems that are often encountered during an NFS installation. To verify the ISO images are intact prior to performing an installation, use an `md5sum` program (many `md5sum` programs are available for various operating systems). An `md5sum` program should be available on the same server as the ISO images.

Additionally, if a file called `updates.img` exists in the directory from which you install, then it will be used for installation program updates. Refer to the file `install-methods.txt` in the `anaconda` RPM package for detailed information on the various ways to install Red Hat Enterprise Linux, as well as how to apply the installation program updates.

**Note**

You can only have the ISO images for one release and one variant of Red Hat Enterprise Linux in the directory.

## 1.4. Preparing for a Hard Drive Installation

Hard drive installations require a working Linux system installed and the use of ISO (or CD-ROM) images rather than the entire installation tree.

Hard drive installations only work from ext2 or ext3 file systems.

- Set of CD-ROMs — Create CD-ROM ISO image files from each installation CD-ROMs. For each CD-ROM, execute the following command on a Linux system:

  `dd if=/dev/cdrom of=/tmp/file-name.iso`

  This command may raise an error message when the end of data on the CD-ROM is reached which can be ignored. The ISO images created can now be used for installation, once copied to the correct DASD.
- ISO images — transfer these images to the system to be installed (or to the correct DASD).

  Verifying that ISO images are intact before you attempt an installation, helps to avoid problems. To verify the ISO images are intact prior to performing an installation, use an `md5sum` program (many `md5sum` programs are available for various operating systems). An `md5sum` program should be available on the same Linux machine as the ISO images.

  Make the correct DASDs accessible to the new VM or LPAR, and then proceed with installation.

## 1.5. Installing under VM

Log onto the VM as the Linux guest account. You can use x3270 or c3270 (from the x3270-text package in Red Hat Enterprise Linux) to log in to the VM from other Linux systems. Alternatively, use the OS/2 3270 terminal emulator on the S/390 management console. If you are working from a Windows based machine, Jolly Giant (http://www.jollygiant.com/) offers an SSL enabled 3270 emulator.

If you are not in CMS mode, enter it now.

```
i cms
```

If necessary, add the device containing the VM's TCP/IP tools to your CMS disk list. For example:

```
vmlink tcpmaint 592
```

FTP to the machine containing the Red Hat Enterprise Linux boot images (`kernel.img` and `initrd.img`), log in, and execute the following commands (use the `(repl` option if you are overwriting existing `kernel.img` and `initrd.img` image files):

- `cd /location/of/boot/images/`
- `locsite fix 80`
- `bin`
- `get kernel.img (repl`
- `get initrd.img (repl`
- `quit`

You may now create the parameter file (for example, `redhat.parm`). Refer to Appendix B *Sample Parameter Files* for sample `parm` files. Below is an explanation of the `parm` file contents.

**Important**

Follow these guidelines when creating a parameter file.

- The parameter file should contain no more than 80 characters per line.
- The VM reader has a limit of 11 lines for the parameter file (for a total of 880 characters).
- The DASD and the tape IPL have limits of 896 characters.

The following parameters are required and must be included in the parameter file:

- `DASD=<dasd-list>`

  Where `<dasd-list>` represents the list of DASD devices to be used by Red Hat Enterprise Linux.

  Although autoprobing for DASDs is done if this parameter is omitted, it is highly recommended to include the `DASD=` parameter, as the device numbers (and therefore the device names) can vary when a new DASD is added to the Red Hat Enterprise Linux guest. This can result in an unusable system.

- `root=<file-system>`

  where `<file-system>` represents the device on which the root file system can be found. For installation purposes, it should be set to `/dev/ram0`, which is the ramdisk containing the Red Hat Enterprise Linux installation program.

The following parameters are required to set up networking:

- `CHANDEV=<device>,<input>,<output>`

  Where:

  · `<device>` is the type of device (for example, `ctc0`, `escon0`, or `lcs0`)

  · `<input>` is the input port for this device

  · `<output>` is the output port for this device

  For example:

  ```
  CHANDEV=ctc0,0x600,0x601
  ```

  ```
  CHANDEV=escon0,0x605,0x608
  ```

  ```
  CHANDEV=qeth,0x700,0x701,0x702,0,0
  ```

  To force a specific CTC protocol, additionals parameters can be added. For example:

  ```
  CHANDEV=ctc0,0x600,0x601,0,<n>
  ```

  Where `<n>` is one of the following:

  · `0` for compatibility mode (used with non-Linux peers other than S/390 and zSeries operating systems)

  · `1` for extended mode

  · `2` for CTC-based tty (only supported on Linux-to-Linux connections)

  · `3` for compatibility mode with S/390 and zSeries operating systems

- `IUCV=<userid>`

  Where `<userid>` represents the ID of the guest machines you want to connect to. Note that the ID must be written in capital letters. For example, an IUCV connection to the VM TCP/IP service machine should be written as:

  ```
  IUCV=TCPIP
  ```

The following parameters are optional:

- `HOSTNAME=<string>`

  Where `<string>` is the hostname of the newly-installed Linux guest.

- `NETTYPE=<type>`

  Where `<type>` must be one of the following: `ctc`, `escon`, `tr`, `hsi`, `iucv`, or `eth`.

- `IPADDR=<IP>`

  Where `<IP>` is the IP address of the new Linux guest.

- `NETWORK=<network>`

  Where `<network>` is the address of your network.

- `NETMASK=<netmask>`

  Where `<netmask>` is the netmask.

- `BROADCAST=<broadcast>`

  Where `<broadcast>` is the broadcast address.

- `GATEWAY=<gw>`

  Where `<gw>` is either the gateway-IP for your `eth` device or the IP address of the ctc/escon/iucv point-to-point partner.

- `MTU=<mtu>`

Where <*mtu*> is the Maximum Transmission Unit (MTU) for this connection.

- DNS=<*server1*>:<*server2*>:...:<*serverN*>

  Where <*server1*>:<*server2*>:...:<*serverN*> is a list of DNS servers, separated by colons. For example:

  ```
  DNS=10.0.0.1:10.0.0.2
  ```

- SEARCHDNS=<*domain1*>:<*domain2*>:...:<*domainN*>

  Where <*domain1*>:<*domain2*>:...:<*domainN*> is a list of the search domains, separated by colons. For example:

  ```
  SEARCHDNS=example.com:example.org
  ```

- chandev=ctc0,<read_channel_address>,<write_channel_address>
  CHANDEV=ctc0,<read_channel_address>,<write_channel_address>

  This setup parameter allows the ctc driver to properly connect to the ctc read and write channels if connections are reversed. If the chandev parameter is not set, the driver will default to detected settings, which, depending on the system setup, may have ctc read and write channels reversed. Example: CHANDEV=ctc0,0x600,0x601 — As an alternative to setting this parameter, the read and write channel connections can be physically swapped.

**Note**

When setting the parameters, you must either set both or neither of the parameters (chandev and CHANDEV). These values are necessary for proper boot loader configuration, therefore exactly the same values have to be given for both parameters.

The following parameter for installations using a qeth device is optional:

- QETHPARM=

  Use this option to specify additional parameters for your QETH device (for CHANDEV) such as:

  ```
  add_parms,0x10,{lo_devno,hi_devno},portname:<port_name>
  ```

The following parameter for kickstart installations is optional:

- RUNKS=<*value*>

  Where <*value*> is defined as 1 if you want to run the installation program in noninteractive mode in the 3270 terminal, or 0 otherwise.

**Note**

Make sure that your kickstart file contains all required parameters before you use this option.

If any of the network parameters required to make the network operate correctly are omitted from the parm file, a prompt appears during the installation boot process.

If you logged off, reconnect and log in using the VM guest ID you configured for installation. If you are not in CMS mode, enter it now.

```
i cms
```

Create an executable script containing the commands necessary to IPL the kernel image and start the installation. The following sample script is a typical initial start-up script:

```
/* */
'CL RDR'
'PURGE RDR ALL'
'SPOOL PUNCH * RDR'
'PUNCH KERNEL IMG A (NOH'
'PUNCH REDHAT PARM A (NOH'
'PUNCH INITRD IMG A (NOH'
'CH RDR ALL KEEP NOHOLD'
'IPL 00C CLEAR'
```

The initial installation start-up script prompts you for information about your networking and DASDs unless you have specified all necessary information in the `parm` file.

Once all questions have been answered, you are ready to begin the core installation program, **loader**. To continue with the installation, refer to Chapter 2 *Installing Red Hat Enterprise Linux* for further instructions.

**Note**

If you install over a network with FTP or HTTP you must perform a text mode installation.

## 1.6. Installing in an LPAR using the Red Hat Enterprise Linux LPAR CD

The following steps must be taken when installing Red Hat Enterprise Linux onto an LPAR.

- Log in on the Support Element Workplace (SEW) (some older versions of the SEW are called Hardware Management Consoles) as a user with sufficient privileges to install a new OS to an LPAR. The *SYSPROG* user is recommended.
- Select **Images**, then select the LPAR to which you wish to install. Use the arrows in the frame on the right side to navigate to the **CPC Recovery** menu.
- Double-click on **Load from CD-ROM or Server**.
- In the dialog box that follows, select **Local CD-ROM** then click **Continue**.
- In the dialog that follows, keep the default selection of `redhat.ins` then click **Continue**.
- Skip to Section 1.8 *Installing in an LPAR (Common Steps)* to continue.

## 1.7. Installing in an LPAR without the Red Hat Enterprise Linux for S/390 CD-ROMs

- Log in on the Support Element Workplace as a user with sufficient privileges to install a new OS to an LPAR.
- Select **Images**, then select the LPAR you wish to install to.
- Use the arrows in the frame on the right side to navigate to the **CPC Recovery** menu.
- Double-click on **Load from CD-ROM or Server**.
- In the dialog box that follows, select **FTP Source**, and enter the following information:

Host Computer:

Hostname or IP address of the FTP server you wish to install from (for example, `ftp.redhat.com`)

User ID:

Your user name on the FTP server (or *anonymous*)

Password:

Your password (use your email address if you are logging in as anonymous)

Account:

Leave this field empty

File location (can be left blank):

Directory on the FTP server holding Red Hat Enterprise Linux for S/390 (for example, `/pub/redhat/linux/rawhide/s390`)

- Click **Continue.**
- In the dialog that follows, keep the default selection of `redhat.ins` and click **Continue**.
- Refer to Section 1.8 *Installing in an LPAR (Common Steps)* to continue.

## 1.8. Installing in an LPAR (Common Steps)

Once the Red Hat Enterprise Linux installation program has started (if the red field behind the LPAR icon is disappearing, the installation program has begun), select the LPAR and double-click on **Operating System Messages**.

The initial installation start-up script asks you questions about your networking and DASDs unless you have specified all necessary information in the `lpar.parm` file.

Once all questions have been answered, you are ready to begin the core installation program, **loader**. To continue with the installation, refer to Chapter 2 *Installing Red Hat Enterprise Linux* for further instructions.

**Note**

If you install over a network with FTP or HTTP you must perform a text mode installation.

## 1.9. Do You Have Enough Disk Space?

Nearly every modern-day operating system (OS) uses *disk partitions*, and Red Hat Enterprise Linux is no exception. When you install Red Hat Enterprise Linux, you may have to work with disk partitions.

The disk space used by Red Hat Enterprise Linux must be separate from the disk space used by other OSes you may have installed on your system.

For more information about disks and partition configuration, refer to Section 2.12.4 *Recommended Partitioning Scheme*.

# Chapter 2. Installing Red Hat Enterprise Linux

This chapter explains how to perform a Red Hat Enterprise Linux installation using the graphical, mouse-based installation program. The following topics are discussed:

- Becoming familiar with the installation program's user interface
- Starting the installation program
- Selecting an installation method
- Configuration steps during the installation (language, keyboard, mouse, partitioning, etc.)
- Finishing the installation

## 2.1. The Graphical Installation Program User Interface

If you have used a *graphical user interface (GUI)* before, you are already familiar with this process; use your mouse to navigate the screens, click buttons, or enter text fields. You can also navigate through the installation using the [Tab] and [Enter] keys.

## 2.2. The Text Mode Installation Program User Interface

The Red Hat Enterprise Linux text mode installation program uses a screen-based interface that includes most of the on-screen *widgets* commonly found on graphical user interfaces. Figure 2-1, and Figure 2-2, illustrate the screens that appear during the installation process.

**Note**

While text mode installations are not explicitly documented, those using the text mode installation program can easily follow the GUI installation instructions and obtain all needed information.

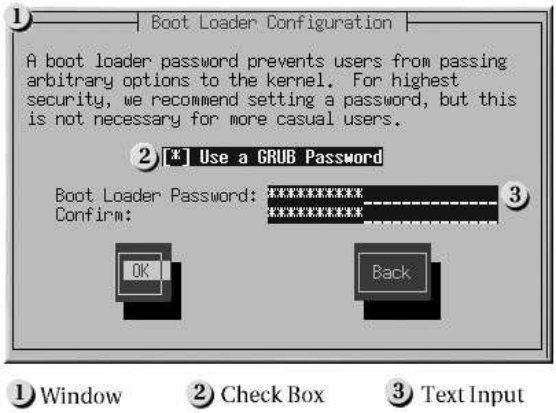
Boot Loader Configuration
A boot loader password prevents users from passing arbitrary options to the kernel. For highest security, we recommend setting a password, but this is not necessary for more casual users.
[*] Use a GRUB Password
Boot Loader Password:
Confirm:
OK
Back
1 Window
2 Check Box
3 Text Input

**Figure 2-1. Installation Program Widgets as seen in Boot Loader Configuration**

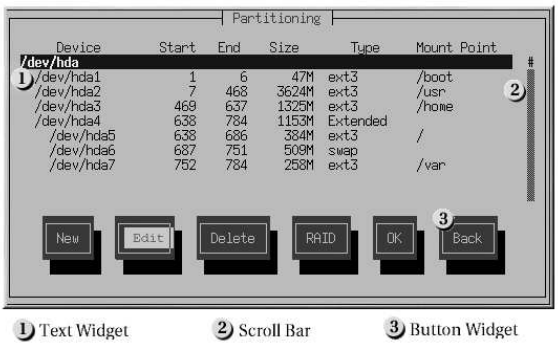


**Figure 2-2. Installation Program Widgets as seen in Disk Druid**

Here is a list of the most important widgets shown in Figure 2-1 and Figure 2-2:

- Window — Windows (usually referred to as *dialogs* in this manual) appear on your screen throughout the installation process. At times, one window may overlay another; in these cases, you can only interact with the window on top. When you are finished in that window, it disappears, allowing you to continue working in the window underneath.
- Checkbox — Checkboxes allow you to select or deselect a feature. The box displays either an asterisk (selected) or a space (unselected). When the cursor is within a checkbox, press [Space] to select or deselect a feature.
- Text Input — Text input lines are regions where you can enter information required by the installation program. When the cursor rests on a text input line, you may enter and/or edit information on that line.
- Text Widget — Text widgets are regions of the screen for the display of text. At times, text widgets may also contain other widgets, such as checkboxes. If a text widget contains more information

than can be displayed in the space reserved for it, a scroll bar appears; if you position the cursor within the text widget, you can then use the [Up] and [Down] arrow keys to scroll through all the information available. Your current position is shown on the scroll bar by a # character, which moves up and down the scroll bar as you scroll.

- Scroll Bar — Scroll bars appear on the side or bottom of a window to control which part of a list or document is currently in the window's frame. The scroll bar makes it easy to move to any part of a file.
- Button Widget — Button widgets are the primary method of interacting with the installation program. You progress through the windows of the installation program by navigating these buttons, using the [Tab] and [Enter] keys. Buttons can be selected when they are highlighted.
- Cursor — Although not a widget, the cursor is used to select (and interact) with a particular widget. As the cursor is moved from widget to widget, it may cause the widget to change color, or the cursor itself may only appear positioned in or next to the widget. In Figure 2-1, the cursor is positioned on the **OK** button. Figure 2-2, shows the cursor on the **Edit** button.

### 2.2.1. Using the Keyboard to Navigate

Navigation through the installation dialogs is performed through a simple set of keystrokes. To move the cursor, use the [Left], [Right], [Up], and [Down] arrow keys. Use [Tab], and [Alt]-[Tab] to cycle forward or backward through each widget on the screen. Along the bottom, most screens display a summary of available cursor positioning keys.

To "press" a button, position the cursor over the button (using [Tab], for example) and press [Space] or [Enter]. To select an item from a list of items, move the cursor to the item you wish to select and press [Enter]. To select an item with a checkbox, move the cursor to the checkbox and press [Space] to select an item. To deselect, press [Space] a second time.

Pressing [F12] accepts the current values and proceeds to the next dialog; it is equivalent to pressing the **OK** button.

**Caution**

Unless a dialog box is waiting for your input, do not press any keys during the installation process (doing so may result in unpredictable behavior).

## 2.3. Running the Installation Program

After following the steps outlined in Chapter 1 *Steps to Get You Started* for booting an LPAR or VM system, `telnet` or `ssh` to the configured Linux install system on the S/390. Logging on via `ssh` is the preferred method.

Although the text mode installation program is run by default for most installations, you can optionally run the graphical installation program available for both VM and LPAR installations via the NFS installation method.

**Note**

If you have a slow network connection or prefer a text-based installation, do not set the `DISPLAY=` variable in the `parm` file. The text-based installation is similar to the graphical installation; however, the graphical installation offers more package selection details and other options not available in text-based installs. It is strongly recommended to use the graphical installation whenever possible.

To run the graphical installation, use a workstation that has an X Window System server or VNC client installed. Use an SSH client that allows X11 forwarding or a Telnet client. SSH is strongly recommended for its security features as well as its ability to forward X and VNC sessions. Enable X11 forwarding in your SSH client prior to connecting to the *Linux image* (the Linux guest running on z/VM).

### 2.3.1. Installation using X11 Forwarding

For example, to connect to the Linux image and display the graphical installation program using OpenSSH with X11 forwarding on a Linux workstation, type the following at the workstation shell prompt:

```
ssh -X linuxvm.example.com
```

The `-X` option enables X11 forwarding.

The graphical installation program cannot be started if your DNS or hostnames are not set correctly, or the Linux image is not allowed to open applications on your display. You can prevent this by setting a correct `DISPLAY=` variable. Add the parameter `DISPLAY=`*`workstationname`*`:0.0` in the parameter file, replacing *`workstationname`* with the hostname of the client workstation connecting to the Linux Image. Allow the Linux image to connect to the workstation using the command `xhost +linuxvm` on the local workstation.

If the graphical installation via NFS does not automatically begin for you, verify the `DISPLAY=` variable settings in the `parm` file. If performing a VM installation, rerun the installation to load the new `parm` file on the reader. Additionally, make sure when performing an X11 forwarded display that the X server is started on the workstation machine. Finally, make sure the NFS installation method is chosen, as this is the only method that supports graphical installations.

### 2.3.2. Installation using VNC

If you are using VNC, a message on the workstation SSH terminal prompts you to start the VNC client viewer and details the VNC display specifications. Enter the specifications from the SSH terminal into the VNC client viewer and connect to the Linux image to begin the installation.

Once you have logged into the Linux image the `loader` will start the installation program.

When the `loader` starts, several screens appear for selecting the installation method.

## 2.4. Installing from a Hard Drive (DASD)

**Note**

DASD installations only work from ext2 or ext3 file systems. If you have a file system other than ext2 or ext3 you will not be able to perform a DASD installation.

Additionally, if a file called `RedHat/base/updates.img` exists in the directory from which you install, it is used for installation program updates. Refer to the file `install-methods.txt` in the `anaconda` RPM package for detailed information on the various ways to install Red Hat Enterprise Linux, as well as how to apply the installation program updates.

The **Select Partition** screen applies only if you are installing from a disk partition (that is, if you selected **Hard Drive** in the **Installation Method** dialog). This dialog allows you to name the disk partition and directory from which you are installing Red Hat Enterprise Linux.

Enter the device name of the partition containing the Red Hat Enterprise Linux ISO images. There is also a field labeled **Directory holding images**.

If the ISO images are in the root (top-level) directory of that partition, enter the path to the ISO images (for example, if the partition on which the ISO images are located is normally mounted as `/home/`, and the images are in `/home/new/`, you would enter `new`).

If the ISO images are *not* in the root (top-level) directory of that partition, enter the full path to the ISO images (for example, if the ISO images are located in `/test/new/`, you would enter `/test/new/`).

After you have identified the disk partition, the **Welcome** dialog appears.

## 2.5. Installing via NFS

The NFS dialog applies only if you are installing from an NFS server (if you selected **NFS Image** in the **Installation Method** dialog).

Enter the domain name of your NFS server. For example, if you are installing from a host named `eastcoast` in the domain `example.com`, enter `eastcoast.example.com` in the **NFS Server** field.

Next, enter the name of the exported directory. If you followed the setup described in Section 1.3 *Preparing for a Network Installation*, you would enter the directory */location/of/disk/space/* which contains the `RedHat/` directory.

If the NFS server is exporting a mirror of the Red Hat Enterprise Linux installation tree, enter the directory which contains the `RedHat/` directory. (If you do not know this directory path, ask your system administrator.) For example, if the NFS site contains the directory `/mirrors/redhat/`*`arch`*`/RedHat/`, enter `/mirrors/redhat/`*`arch`*`/` (where *arch* is replaced with the architecture type of your system, such as i386, ia64, ppc, or s390). If everything was specified properly, a message appears indicating that the installation program for Red Hat Enterprise Linux is running.

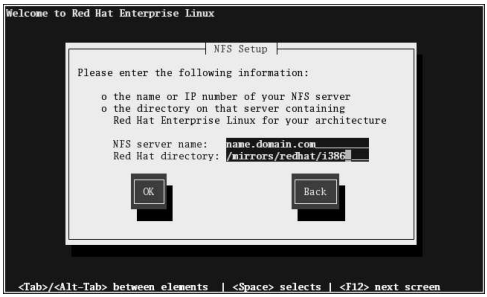
Welcome to Red Hat Enterprise Linux
NFS Setup
Please enter the following information:
o the name or IP number of your NFS server
o the directory on that server containing
Red Hat Enterprise Linux for your architecture
NFS server name: name.domain.com
Red Hat directory: /mirrors/redhat/i386
OK
Back
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

**Figure 2-3. NFS Setup Dialog**

If the NFS server is exporting the ISO images of the Red Hat Enterprise Linux CD-ROMs, enter the directory which contains the ISO images.

Next, the **Welcome** dialog appears.

## 2.6. Installing via FTP

The FTP dialog applies only if you are installing from an FTP server (if you selected **FTP** in the **Installation Method** dialog). This dialog allows you to identify the FTP server from which you are installing Red Hat Enterprise Linux.

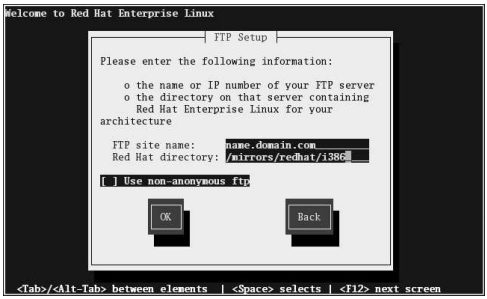
Welcome to Red Hat Enterprise Linux
FTP Setup
Please enter the following information:
o the name or IP number of your FTP server
o the directory on that server containing
Red Hat Enterprise Linux for your
architecture
FTP site name: name.domain.com
Red Hat directory: /mirrors/redhat/i386
[ ] Use non-anonymous ftp
OK
Back
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

**Figure 2-4. FTP Setup Dialog**

Enter the name or IP address of the FTP site you are installing from, and the name of the directory containing the `RedHat/` installation files for your architecture. For example, if the FTP site contains the directory `/mirrors/redhat/`*`arch`*`/RedHat/`, enter `/mirrors/redhat/`*`arch`*`/` (where *`arch`* is replaced with the architecture type of your system, such as i386, ia64, ppc, or s390). If everything was specified properly, a message box appears indicating that `base/hdlist` is being retrieved.

Next, the **Welcome** dialog appears.

**Tip**

You can save disk space by using the ISO images you have already copied to the server. To accomplish this, install Red Hat Enterprise Linux using ISO images without copying them into a single tree by loopback mounting them. For each ISO image:

```
mkdir disc1

mount -o loop example-1.iso disc1
```

## 2.7. Installing via HTTP

The HTTP dialog applies only if you are installing from an HTTP server (if you selected **HTTP** in the **Installation Method** dialog). This dialog prompts you for information about the HTTP server from which you are installing Red Hat Enterprise Linux.

Enter the name or IP address of the HTTP site you are installing from, and the name of the directory containing the `RedHat/` installation files for your architecture. For example, if the HTTP site contains the directory `/mirrors/redhat/`*`arch`*`/RedHat/`, enter `/mirrors/redhat/`*`arch`*`/` (where *`arch`* is replaced with the architecture type of your system, such as i386, ia64, ppc, or s390). If everything was specified properly, a message box appears indicating that `base/hdlist` is being retrieved.

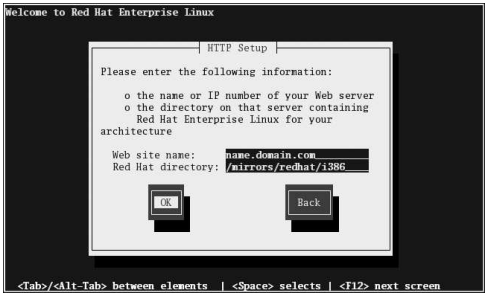
Welcome to Red Hat Enterprise Linux
HTTP Setup
Please enter the following information:
o the name or IP number of your Web server
o the directory on that server containing Red Hat Enterprise Linux for your architecture
Web site name: name.domain.com
Red Hat directory: /mirrors/redhat/i386
OK
Back
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen

**Figure 2-5. HTTP Setup Dialog**

Next, the **Welcome** dialog appears.

**Tip**

You can save disk space by using the ISO images you have already copied to the server. To accomplish this, install Red Hat Enterprise Linux using ISO images without copying them into a single tree by loopback mounting them. For each ISO image:

```
mkdir disc1

mount -o loop example-1.iso disc1
```

## 2.8. Welcome to Red Hat Enterprise Linux

The **Welcome** screen does not prompt you for any input. Read over the help text in the left panel for additional instructions and information on where to register your Red Hat Enterprise Linux product.

Notice the **Hide Help** button at the bottom left corner of the screen. The help screen is open by default. If you do not want to view the help information, click on **Hide Help** to minimize the help portion of the screen.

Click on the **Next** button to continue.

## 2.9. Language Selection

Using your mouse, select the language you would prefer to use for the installation (refer to Figure 2-6).

Selecting the appropriate language also helps target your time zone configuration later in the installation. The installation program tries to define the appropriate time zone based on what you specify on this screen.

**Figure 2-6. Language Selection**

Once you select the appropriate language, click **Next** to continue.

## 2.10. Disk Partitioning Setup

Partitioning allows you to divide your hard drive into isolated sections, where each section behaves as its own hard drive. Partitioning is particularly useful if you run multiple operating systems.

On this screen, you can choose to perform automatic partitioning, or manual partitioning using **Disk Druid**.

Automatic partitioning allows you to perform an installation without having to partition your drive(s) yourself. If you do not feel comfortable with partitioning your system, it is recommended that you *do not* choose to partition manually and instead let the installation program partition for you.

To partition manually, choose the **Disk Druid** partitioning tool.

**Warning**

The **Red Hat Update Agent** downloads updated packages to `/var/spool/up2date/` by default. If you partition the system manually, and create a separate `/var/` partition, be sure to create the partition large enough (3.0 GB more more) to download package updates.

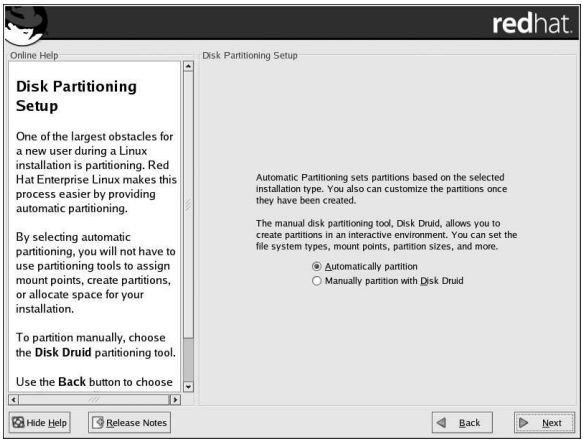
redhat
Online Help
Disk Partitioning Setup
Disk Partitioning Setup
One of the largest obstacles for a new user during a Linux installation is partitioning. Red Hat Enterprise Linux makes this process easier by providing automatic partitioning.
By selecting automatic partitioning, you will not have to use partitioning tools to assign mount points, create partitions, or allocate space for your installation.
To partition manually, choose the Disk Druid partitioning tool.
Use the Back button to choose
Automatic Partitioning sets partitions based on the selected installation type. You also can customize the partitions once they have been created.
The manual disk partitioning tool, Disk Druid, allows you to create partitions in an interactive environment. You can set the file system types, mount points, partition sizes, and more.
Automatically partition
Manually partition with Disk Druid
Hide Help
Release Notes
Back
Next

**Figure 2-7. Disk Partitioning Setup**

If you chose to manually partition using **Disk Druid**, refer to Section 2.12 *Partitioning Your System*.

**Warning**

If you receive an error after the **Disk Partitioning Setup** phase of the installation saying something similar to

**The partition table on device hda was unreadable. To create new partitions it must be initialized, causing the loss of ALL DATA on this drive.**

You may not have a partition table on that drive or the partition table on the drive may not be recognizable by the partitioning software used in the installation program.

No matter what type of installation you are performing, backups of the existing data on your systems should always be made.

## 2.11. Automatic Partitioning

Automatic partitioning allows you to have some control concerning what data is removed (if any) from your system. Your options are:

- **Remove all Linux partitions on this system** — select this option to remove only Linux partitions (partitions created from a previous Linux installation). This will not remove other partitions you may have on your hard drive(s).
- **Remove all partitions on this system** — select this option to remove all partitions on your hard drive(s) (this includes partitions created by other operating systems).

**Caution**

If you select this option, all data on the selected hard drive(s) is removed by the installation program. Do not select this option if you have information that you want to keep on the hard drive(s) where you are installing Red Hat Enterprise Linux.

- **Keep all partitions and use existing free space** — select this option to retain your current data and partitions, assuming you have enough free space available on your hard drive(s).

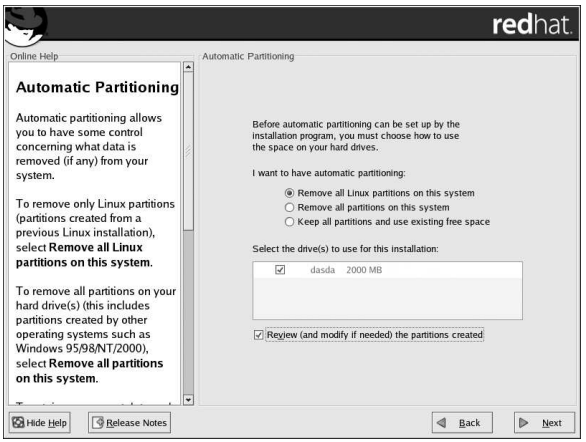
redhat.
Online Help
Automatic Partitioning
Automatic Partitioning
Automatic partitioning allows you to have some control concerning what data is removed (if any) from your system.
To remove only Linux partitions (partitions created from a previous Linux installation), select Remove all Linux partitions on this system.
To remove all partitions on your hard drive(s) (this includes partitions created by other operating systems such as Windows 95/98/NT/2000), select Remove all partitions on this system.
Automatic Partitioning
Before automatic partitioning can be set up by the installation program, you must choose how to use the space on your hard drives.
I want to have automatic partitioning:
Remove all Linux partitions on this system
Remove all partitions on this system
Keep all partitions and use existing free space
Select the drive(s) to use for this installation:
dasda 2000 MB
Review (and modify if needed) the partitions created
Hide Help
Release Notes
Back
Next

**Figure 2-8. Automatic Partitioning**

Using your mouse, choose the hard drive(s) on which you want Red Hat Enterprise Linux to be installed. If you have two or more hard drives, you can choose which hard drive(s) should contain this installation. Unselected hard drives, and any data on them, are not touched.

**Note**

It is always a good idea to back up any data that you have on your systems. For example, if you are upgrading or creating a dual-boot system, you should back up any data you wish to keep on your hard drive(s). Mistakes do happen and can result in the loss of all your data.

To review and make any necessary changes to the partitions created by automatic partitioning, select the **Review** option. After selecting **Review** and clicking **Next** to move forward, the partitions created for you in **Disk Druid** appear. You can make modifications to these partitions if they do not meet your needs.

Click **Next** once you have made your selections to proceed.

## 2.12. Partitioning Your System

At this point, you must tell the installation program where to install Red Hat Enterprise Linux. This is done by defining mount points for one or more disk partitions in which Red Hat Enterprise Linux will be installed.

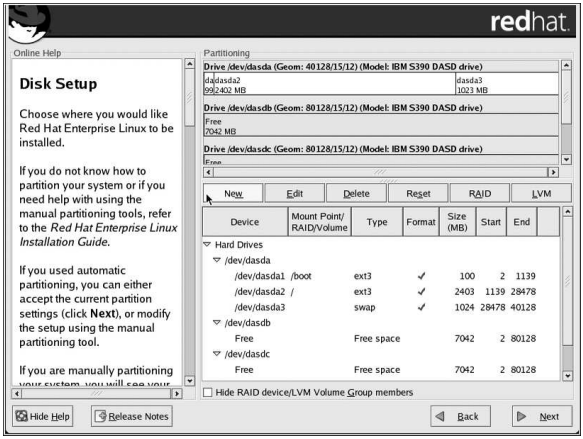
redhat.
Online Help
Disk Setup
Choose where you would like Red Hat Enterprise Linux to be installed.
If you do not know how to partition your system or if you need help with using the manual partitioning tools, refer to the Red Hat Enterprise Linux Installation Guide.
If you used automatic partitioning, you can either accept the current partition settings (click Next), or modify the setup using the manual partitioning tool.
If you are manually partitioning
Partitioning
Drive /dev/dasda (Geom: 40128/15/12) (Model: IBM S390 DASD drive)
dadasda2
9912402 MB
dasda3
1023 MB
Drive /dev/dasdb (Geom: 80128/15/12) (Model: IBM S390 DASD drive)
Free
7042 MB
Drive /dev/dasdc (Geom: 80128/15/12) (Model: IBM S390 DASD drive)
New
Edit
Delete
Reset
RAID
LVM
Device
Mount Point/ RAID/Volume
Type
Format
Size (MB)
Start
End
Hard Drives
/dev/dasda
/dev/dasda1 /boot ext3 100 2 1139
/dev/dasda2 / ext3 2403 1139 28478
/dev/dasda3 swap 1024 28478 40128
/dev/dasdb
Free Free space 7042 2 80128
/dev/dasdc
Free Free space 7042 2 80128
Hide RAID device/LVM Volume Group members
Hide Help
Release Notes
Back
Next

**Figure 2-9. Partitioning with Disk Druid**

The partitioning tool used by the installation program is **Disk Druid**. With the exception of certain esoteric situations, **Disk Druid** can handle the partitioning requirements for a typical installation.

### 2.12.1. Graphical Display of DASD Device(s)

**Disk Druid** offers a graphical representation of your DASD device(s).

Using your mouse, click once to highlight a particular field in the graphical display. Double-click to edit an existing partition and assign a mount point.

Above the display, you can review the **Drive** name (such as /dev/dasda), the **Geom** (which shows the hard disk's geometry and consists of three numbers representing the number of cylinders, heads, and sectors as reported by the hard disk), and the **Model** of the hard drive as detected by the installation program.

### 2.12.2. Disk Druid's Buttons

These buttons control **Disk Druid's** actions. They are used to change the attributes of a partition (for example the file system type and mount point) and also to create RAID devices. Buttons on this screen are also used to accept the changes you have made, or to exit **Disk Druid**. For further explanation, take a look at each button in order:

- **Edit**: Used to modify attributes of the partition currently selected in the **Partitions** section. Selecting **Edit** opens a dialog box. Some or all of the fields can be edited, depending on whether the partition information has already been written to disk.
- **Make RAID**: **Make RAID** can be used if you want to provide redundancy to any or all disk partitions. *It should only be used if you have experience using RAID.* To read more about RAID, refer to the *RAID (Redundant Array of Independent Disks)* chapter in the *Red Hat Enterprise Linux System Administration Guide*.
- To make a RAID device, you must first create (or reuse existing) software RAID partitions. Once you have created two or more software RAID partitions, select **Make RAID** to join the software RAID partitions into a RAID device.

### 2.12.3. Partition Fields

Above the partition hierarchy are labels which present information about the partitions you are creating. The labels are defined as follows:

- **Device**: This field displays the partition's device name.
- **Mount Point/RAID/Volume**: A mount point is the location within the directory hierarchy at which a volume exists; the volume is "mounted" at this location. This field indicates where the partition is mounted. If a partition exists, but is not set, then you need to define its mount point. Double-click on the partition or click the **Edit** button.
- **Type**: This field shows the partition's type (for example, ext2 or ext3).
- **Format**: This field shows if the partition being created will be formatted.
- **Size (MB)**: This field shows the partition's size (in MB).
- **Start**: This field shows the cylinder on your hard drive where the partition begins.
- **End**: This field shows the cylinder on your hard drive where the partition ends.

**Hide RAID device/LVM Volume Group members**: Select this option if you do not want to view any RAID device or LVM Volume Group members that have been created.

### 2.12.4. Recommended Partitioning Scheme

Unless you have a reason for doing otherwise, we recommend that you create the following partitions:

- A swap partition (at least 256 MB) — swap partitions are used to support virtual memory. In other words, data is written to a swap partition when there is not enough RAM to store the data your system is processing. The size of your swap partition should be equal to twice your computer's RAM, or 256 MB, whichever amount is larger, but no more than 2048 MB (or 2 GB).

  For example, if you have 1 GB of RAM or less, your swap partition should be at least equal to the amount of RAM on your system, up to two times the RAM. For more than 1 GB of RAM, 2 GB of swap is recommended. Creating a large swap space partition can be especially helpful if you plan to upgrade your RAM at a later time.

  **Tip**

  If your partitioning scheme requires a swap partition that is larger than 2 GB, you should create an additional swap partition. For example, if you have 4 GB of RAM, you may want to create two 2 GB swap partitions.

- A `/boot/` partition (100 MB) — the partition mounted on `/boot/` contains the operating system kernel (which allows your system to boot Red Hat Enterprise Linux), along with files used during the bootstrap process. Due to the limitations of most PC BIOSes, creating a small partition to hold these files is a good idea. For most users, a 100 MB boot partition is sufficient.
- A `root` partition (1.2 - 5.0 GB) — this is where "`/`" (the root directory) is located. In this setup, all files (except those stored in `/boot`) are on the root partition. A 1.2 GB root partition permits the equivalent of a basic installation (with *very* little free space), while a 5.0 GB root partition lets you install all package groups.
- A `/var/` partition (3.0 GB or larger) — the `/var/` partition is where variable data files are written. This includes spool directories and files, administrative and logging data, and transient and temporary files. Updates that are applied to Red Hat Enterprise Linux are written to the `/var/` partition.

### 2.12.5. Editing Partitions

To edit a partition, select the **Edit** button or double-click on the existing partition.

**Note**

If the partition already exists on your hard disk, you can only change the partition's mount point. To make any other changes, you must delete the partition and recreate it.

## 2.13. Network Configuration

If you do not have a network device this screen is not shown. Skip ahead to Section 2.14 *Firewall Configuration*.

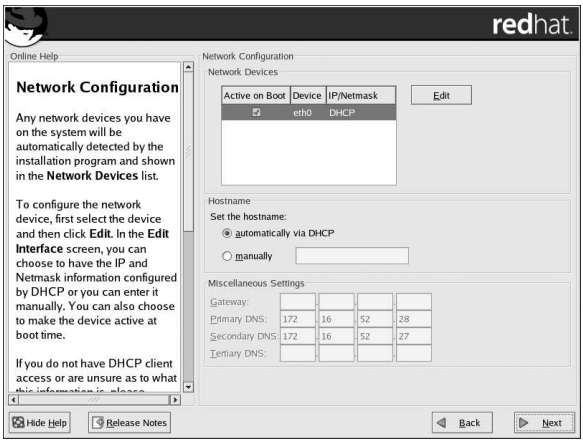


**Figure 2-10. Network Configuration**

The installation program automatically detects any network devices you have and display them in the **Network Devices** list.

Once you have selected a network device, click **Edit**. From the **Edit Interface** pop-up screen, you can choose to configure the IP address and Netmask of the device via DHCP (or manually if DHCP is not selected) and you can choose to activate the device at boot time. If you select **Activate on boot**, your network interface is started when you boot. If you do not have DHCP client access or you are unsure what to provide here, please contact your network administrator.

**Note**

DHCP is not available for automatic configuration of CTC/Escon devices. Point-to-Point addresses are used to configure connections for these devices.

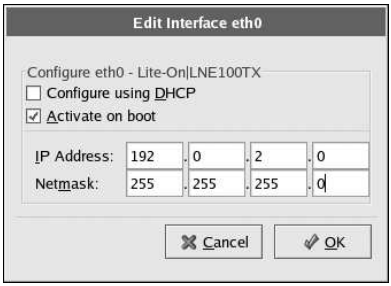
Edit Interface eth0
Configure eth0 - Lite-On|LNE100TX
Configure using DHCP
Activate on boot
IP Address: 192 . 0 . 2 . 0
Netmask: 255 . 255 . 255 . 0
Cancel
OK

**Figure 2-11. Editing a Network Device**

**Note**

Do not use the numbers as seen in this sample configuration. These values will not work for your own network configuration. If you are not sure what values to enter, contact your network administrator for assistance.

If you have a hostname (fully qualified domain name) for the network device, you can choose to have DHCP (Dynamic Host Configuration Protocol) automatically detect it or you can manually enter the hostname in the field provided.

Finally, if you entered the IP and Netmask information manually, you may also enter the Gateway address and the Primary, Secondary, and Tertiary DNS addresses.

**Tip**

Even if your computer is not part of a network, you can enter a hostname for your system. If you do not take this opportunity to enter a name, your system will be known as `localhost`.

**Tip**

To change your network configuration after you have completed the installation, use the **Network Administration Tool**.

Type the `redhat-config-network` command in a shell prompt to launch the **Network Administration Tool**. If you are not root, it prompts you for the root password to continue.

## 2.14. Firewall Configuration

Red Hat Enterprise Linux offers firewall protection for enhanced system security. A firewall exists between your computer and the network, and determines which resources on your computer remote users on the network can access. A properly configured firewall can greatly increase the security of your system.

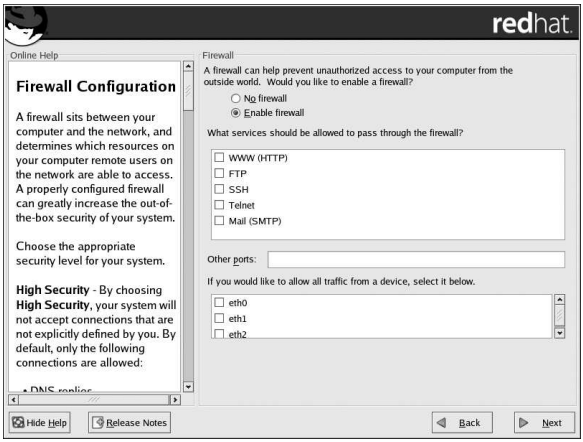
redhat
Online Help
Firewall Configuration
A firewall sits between your computer and the network, and determines which resources on your computer remote users on the network are able to access. A properly configured firewall can greatly increase the out-of-the-box security of your system.
Choose the appropriate security level for your system.
High Security - By choosing High Security, your system will not accept connections that are not explicitly defined by you. By default, only the following connections are allowed:
Firewall
A firewall can help prevent unauthorized access to your computer from the outside world. Would you like to enable a firewall?
No firewall
Enable firewall
What services should be allowed to pass through the firewall?
WWW (HTTP)
FTP
SSH
Telnet
Mail (SMTP)
Other ports:
If you would like to allow all traffic from a device, select it below.
eth0
eth1
eth2
Hide Help
Release Notes
Back
Next

**Figure 2-12. Firewall Configuration**

Choose the appropriate security level for your system.

**No firewall**

**No firewall** provides complete access to your system and does no security checking. Security checking is the disabling of access to certain services. This should only be selected if you are running on a trusted network (not the Internet) or plan to do more firewall configuration later.

**Enable firewall**

If you choose **Enable firewall**, connections are not accepted by your system (other than the default settings) that are not explicitly defined by you. By default, only connections in response to outbound requests, such as DNS replies or DHCP requests, are allowed. If access to services running on this machine is needed, you can choose to allow specific services through the firewall.

If you are connecting your system to the Internet, but do not plan to run a server, this is the safest choice.

Next, select which services, if any, should be allowed to pass through the firewall.

Enabling these options allow the specified services to pass through the firewall. Note, these services may *not* be installed on the system by default. Make sure you choose to enable any options that you may need.

**WWW (HTTP)**

The HTTP protocol is used by Apache (and by other Web servers) to serve webpages. If you plan on making your Web server publicly available, enable this option. This option is not required for viewing pages locally or for developing webpages. You must install the `httpd` package if you want to serve webpages.

Enabling **WWW (HTTP)** does not open a port for HTTPS. To enable HTTPS, specify it in the **Other ports** field.

**FTP**

The FTP protocol is used to transfer files between machines on a network. If you plan on making your FTP server publicly available, enable this option. You must install the `vsftpd` package for this option to be useful.

**SSH**

*S*ecure *SH*ell (SSH) is a suite of tools for logging in to and executing commands on a remote machine. If you plan to use SSH tools to access your machine through a firewall, enable this option. You need to have the `openssh-server` package installed in order to access your machine remotely, using SSH tools.

**Telnet**

Telnet is a protocol for logging in to remote machines. Telnet communications are unencrypted and provide no security from network snooping. Allowing incoming Telnet access is not recommended. To allow inbound Telnet access, you must install the `telnet-server` package.

**Mail (SMTP)**

If you want to allow incoming mail delivery through your firewall, so that remote hosts can connect directly to your machine to deliver mail, enable this option. You do not need to enable this if you collect your mail from your ISP's server using POP3 or IMAP, or if you use a tool such as `fetchmail`. Note that an improperly configured SMTP server can allow remote machines to use your server to send spam.

You can allow access to ports which are not listed here by listing them in the **Other ports** field. Use the following format: **`port:protocol`**. For example, if you want to allow IMAP access through your firewall, you can specify **`imap:tcp`**. You can also explicitly specify numeric ports; to allow UDP packets on port 1234 through the firewall, enter **`1234:udp`**. To specify multiple ports, separate them with commas.

Finally, select any devices should allow access to your system for all traffic from that device.

Selecting any of these trusted devices excludes them from the firewall rules. For example, if you are using **eth0** as a local networking device and using **eth1** to connect to the Internet, any traffic coming from your local network is allowed. Selecting **eth0** as trusted means all traffic over the Ethernet is allowed, but the **eth1** interface is still firewalled. If you want to restrict traffic on an interface, leave it unchecked.

It is not recommended that you make any device that is connected to public networks, such as the Internet, a trusted device.

**Tip**

To change your security level configuration after you have completed the installation, use the **Security Level Configuration Tool**.

Type the `redhat-config-securitylevel` command in a shell prompt to launch the **Security Level Configuration Tool**. If you are not root, it prompts you for the root password to continue.

## 2.15. Language Support Selection

You can install and support multiple languages for use on your system.

You must select a language to use as the default language. The default language is the language used on the system once the installation is complete. If you choose to install other languages during this installation, you can change your default language after the installation.

If you are only going to use one language on your system, selecting only that language saves significant disk space. The default language is the language you selected to use during the installation.

**Caution**

If you select only one language, you can only use that specified language after the installation is complete.

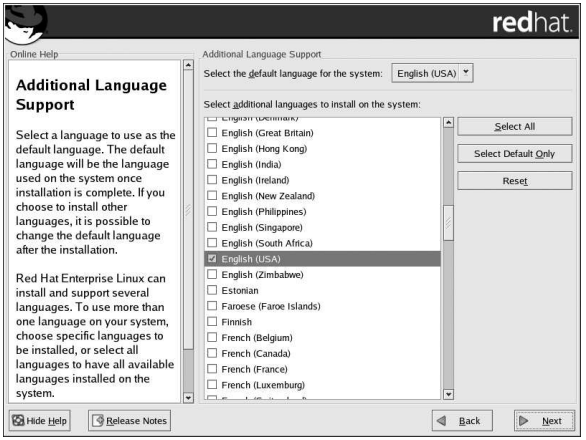
redhat
Online Help
Additional Language Support
Select the default language for the system:
English (USA)
Select additional languages to install on the system:
Additional Language Support
Select a language to use as the default language. The default language will be the language used on the system once installation is complete. If you choose to install other languages, it is possible to change the default language after the installation.
Red Hat Enterprise Linux can install and support several languages. To use more than one language on your system, choose specific languages to be installed, or select all languages to have all available languages installed on the system.
English (Great Britain)
English (Hong Kong)
English (India)
English (Ireland)
English (New Zealand)
English (Philippines)
English (Singapore)
English (South Africa)
English (USA)
English (Zimbabwe)
Estonian
Faroese (Faroe Islands)
Finnish
French (Belgium)
French (Canada)
French (France)
French (Luxemburg)
Select All
Select Default Only
Reset
Hide Help
Release Notes
Back
Next

**Figure 2-13. Language Support Selection**

To use more than one language on your system, choose specific languages to be installed or select all languages to have all available languages installed on your Red Hat Enterprise Linux system.

Use the **Reset** button to cancel your selections. Resetting reverts to the default; only the language you selected for use during the installation is installed.

**Tip**

To change the language configuration after you have completed the installation, use the **Language Configuration Tool**.

Type the `redhat-config-language` command in a shell prompt to launch the **Language Configuration Tool**. If you are not root, it prompts you for the root password to continue.

## 2.16. Time Zone Configuration

You can set your time zone by selecting your computer's physical location or by specifying your time zone's offset from Universal Time, Coordinated (UTC).

Notice the two tabs at the top of the screen (refer to Figure 2-14). The first tab allows you to configure your time zone by your location.

On the interactive map, you can also click on a specific city, which is marked by a yellow dot; a red **X** appears indicating your selection. You can also scroll through a list and choose a time zone.

The second tab allows you to specify a UTC offset. The tab displays a list of offsets to choose from, as well as an option to set daylight saving time.

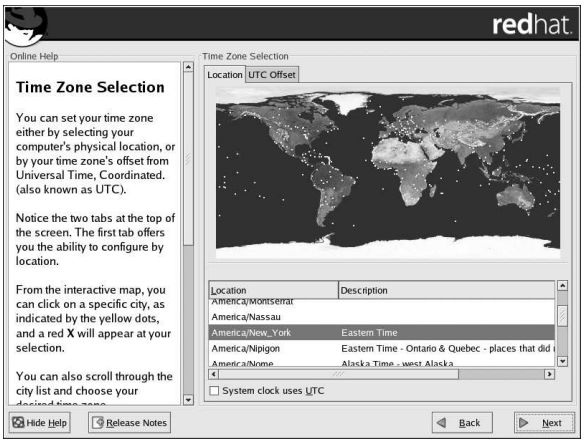
redhat
Online Help
Time Zone Selection
You can set your time zone either by selecting your computer's physical location, or by your time zone's offset from Universal Time, Coordinated. (also known as UTC).
Notice the two tabs at the top of the screen. The first tab offers you the ability to configure by location.
From the interactive map, you can click on a specific city, as indicated by the yellow dots, and a red X will appear at your selection.
You can also scroll through the city list and choose your
Time Zone Selection
Location
UTC Offset
Location
Description
America/Montserrat
America/Nassau
America/New_York
Eastern Time
America/Nipigon
Eastern Time - Ontario & Quebec - places that did
America/Nome
Alaska Time - west Alaska
System clock uses UTC
Hide Help
Release Notes
Back
Next

**Figure 2-14. Configuring the Time Zone**

On both tabs, you can select **System Clock uses UTC**. Please select this if you know that your system is set to UTC.

**Tip**

To change your time zone configuration after you have completed the installation, use the **Time and Date Properties Tool**.

Type the `redhat-config-date` command in a shell prompt to launch the **Time and Date Properties Tool**. If you are not root, it prompts you for the root password to continue.

To run the **Time and Date Properties Tool** as a text-based application, use the command `timeconfig`.

## 2.17. Set Root Password

Setting up a root account and password is one of the most important steps during your installation. Your root account is similar to the administrator account used on Windows NT machines. The root account is used to install packages, upgrade RPMs, and perform most system maintenance. Logging in as root gives you complete control over your system.

**Note**

The root user (also known as the superuser) has complete access to the entire system; for this reason, logging in as the root user is best done *only* to perform system maintenance or administration.

redhat
Online Help
Set Root Password
Use the root account only for administration. Once the installation has been completed, create a non-root account for your general use and su – to gain root access when you need to fix something quickly. These basic rules will minimize the chances of a typo or incorrect command doing damage to your system.
Set Root Password
Enter the root (administrator) password for the system.
Root Password:
Confirm:
Hide Help
Release Notes
Back
Next

**Figure 2-15. Root Password**

Use the root account only for system administration. Create a non-root account for your general use and `su -` to root when you need to fix something quickly. These basic rules minimize the chances of a typo or an incorrect command doing damage to your system.

**Tip**

To become root, type `su -` at the shell prompt in a terminal window and then press [Enter]. Then, enter the root password and press [Enter].

The installation program prompts you to set a root password[1] for your system. *You cannot proceed to the next stage of the installation process without entering a root password.*

The root password must be at least six characters long; the password you type is not echoed to the screen. You must enter the password twice; if the two passwords do not match, the installation program asks you to enter them again.

You should make the root password something you can remember, but not something that is easy for someone else to guess. Your name, your phone number, *qwerty*, *password, root*, *123456*, and *anteater* are all examples of bad passwords. Good passwords mix numerals with upper and lower case letters and do not contain dictionary words: *Aard387vark* or *420BMttNT*, for example. Remember that the password is case-sensitive. If you write down your password, keep it in a secure place. However, it is recommended that you do not write down this or any password you create.

**Note**

Do not use one of the example passwords offered in this manual. Using one of these passwords could be considered a security risk.

1. A root password is the administrative password for your Red Hat Enterprise Linux system. You should only log in as root when needed for system maintenance. The root account does not operate within the restrictions placed on normal user accounts, so changes made as root can have implications for your entire system.

**Tip**

To change your root password after you have completed the installation, use the **Root Password Tool**.

Type the `redhat-config-rootpassword` command in a shell prompt to launch the **Root Password Tool**. If you are not root, it prompts you for the root password to continue.

## 2.18. Package Group Selection

After your partitions have been selected and configured for formatting, you are ready to select packages for installation.

First, a screen appears that details the default package set for your Red Hat Enterprise Linux installation. This screen varies depending on the version of Red Hat Enterprise Linux you are installing.

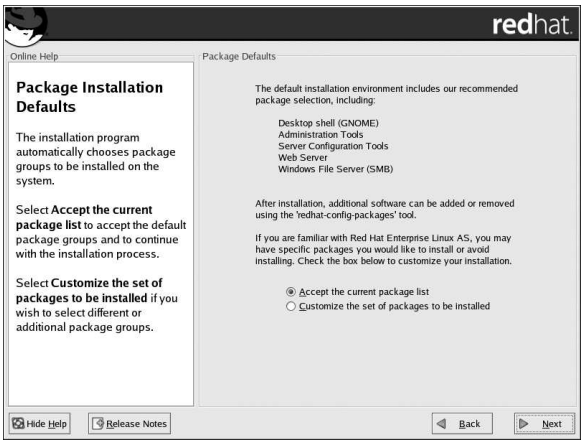
redhat
Online Help
Package Defaults
Package Installation Defaults
The installation program automatically chooses package groups to be installed on the system.
Select Accept the current package list to accept the default package groups and to continue with the installation process.
Select Customize the set of packages to be installed if you wish to select different or additional package groups.
The default installation environment includes our recommended package selection, including:
Desktop shell (GNOME)
Administration Tools
Server Configuration Tools
Web Server
Windows File Server (SMB)
After installation, additional software can be added or removed using the 'redhat-config-packages' tool.
If you are familiar with Red Hat Enterprise Linux AS, you may have specific packages you would like to install or avoid installing. Check the box below to customize your installation.
Accept the current package list
Customize the set of packages to be installed
Hide Help
Release Notes
Back
Next

**Figure 2-16. Default Package List Confirmation**

To customize your package set further, select **Customize the set of packages to be installed** option on the screen. Clicking **Next** takes you to the **Package Group Selection** screen.

If you choose to accept the current package list, skip ahead to Section 2.19 *Preparing to Install*.

You can select package groups, which group components together according to function (for example, **X Window System** and **Editors**), individual packages, or a combination of the two.

**Note**

Users of zSeries systems who want support for developing or running 31-bit applications are encouraged to select the **Compatibility Arch Support** and **Compatibility Arch Development Support** packages to install architecure specific support for their systems.

To select a component, click on the checkbox beside it (refer to Figure 2-17).

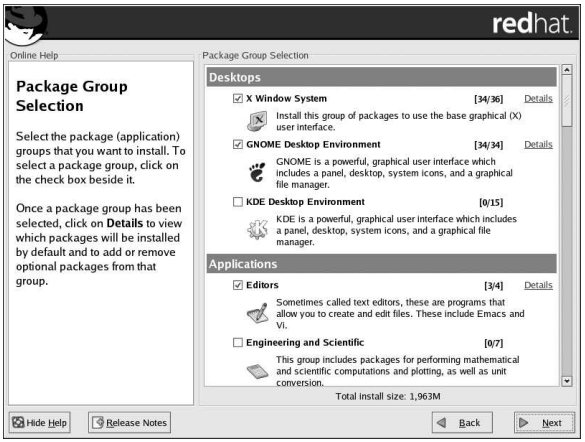
redhat
Online Help
Package Group Selection
Package Group Selection
Select the package (application) groups that you want to install. To select a package group, click on the check box beside it.
Once a package group has been selected, click on Details to view which packages will be installed by default and to add or remove optional packages from that group.
Desktops
X Window System [34/36] Details
Install this group of packages to use the base graphical (X) user interface.
GNOME Desktop Environment [34/34] Details
GNOME is a powerful, graphical user interface which includes a panel, desktop, system icons, and a graphical file manager.
KDE Desktop Environment [0/15]
KDE is a powerful, graphical user interface which includes a panel, desktop, system icons, and a graphical file manager.
Applications
Editors [3/4] Details
Sometimes called text editors, these are programs that allow you to create and edit files. These include Emacs and Vi.
Engineering and Scientific [0/7]
This group includes packages for performing mathematical and scientific computations and plotting, as well as unit conversion.
Total install size: 1,963M
Hide Help
Release Notes
Back
Next

**Figure 2-17. Package Group Selection**

Select each component you wish to install. Selecting **Everything** (at the end of the component list) installs all packages included with Red Hat Enterprise Linux.

Once a package group has been selected, click on **Details** to view which packages will be installed by default, and to add or remove optional packages from that group.

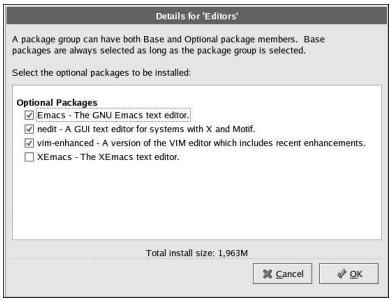
Details for 'Editors'
A package group can have both Base and Optional package members. Base packages are always selected as long as the package group is selected.
Select the optional packages to be installed:
Optional Packages
Emacs - The GNU Emacs text editor.
nedit - A GUI text editor for systems with X and Motif.
vim-enhanced - A version of the VIM editor which includes recent enhancements.
XEmacs - The XEmacs text editor.
Total install size: 1,963M
Cancel
OK

**Figure 2-18. Package Group Details**

## 2.19. Preparing to Install

A screen preparing you for the installation of Red Hat Enterprise Linux now appears.

For your reference, a complete log of your installation can be found in `/root/install.log` once you reboot your system.

**Warning**

If, for some reason, you would rather not continue with the installation process, this is your last opportunity to safely cancel the process and reboot your machine. Once you press the **Next** button,

partitions will be written and packages will be installed. If you wish to abort the installation, you should reboot now before any existing information on any hard drive is rewritten.

To cancel this installation process, you must stop the VM. To do this, and restart CMS, type `#cp i cms` in the 3270 console window.

## 2.20. Installing Packages

At this point there is nothing left for you to do until all the packages have been installed. How quickly this happens depends on the number of packages you have selected and your computer's speed.

## 2.21. Installation Complete

Congratulations! Your Red Hat Enterprise Linux 3 installation is now complete!

The installation program prompts you to prepare your system for reboot.

Once the installation is complete, you must IPL (boot) from the DASD(s) where Red Hat Enterprise Linux has been installed. For example, on the 3270 console you may issue the command `#cp i 200`.

**Note**

Assuming you are to disconnect from the 3270 console, use `#cp disc` instead of `#cp logout` or `#cp log`. This allows Red Hat Enterprise Linux for S/390 to continue running when not connected to the 3270 console.

Following IPLing the installed Red Hat Enterprise Linux OS, you may log on to the system via `telnet` or `ssh`. It is important to note that the only place you can log in as root is from the 3270 or from other devices as listed in `/etc/securetty`. To log in as root from remote systems, use `ssh`.

The first time you start your Red Hat Enterprise Linux machine in run level 5 (the graphical run level), the **Setup Agent** is presented, which guides you through the Red Hat Enterprise Linux configuration. Using this tool, you can set your system time and date, install software, register your machine with Red Hat Network, and more. The **Setup Agent** lets you configure your environment at the beginning, so that you can get started using your Red Hat Enterprise Linux system quickly.

If you are not sure what to do next, we suggest you begin with the other Red Hat Enterprise Linux manuals available online or on the Red Hat Enterprise Linux Documentation CD included with your Red Hat Enterprise Linux product.

HTML, PDF, and RPM versions of the manuals are available on the Red Hat Enterprise Linux Documentation CD and online at http://www.redhat.com/docs/.

**Note**

Although this manual reflects the most current information possible, read the *Red Hat Enterprise Linux Release Notes* for information that may not have been available prior to our documentation being finalized. They can be found on the Red Hat Enterprise Linux CD #1 and online at http://www.redhat.com/docs/.

If you are a more experienced user looking for information on administration topics, you may find the *Red Hat Enterprise Linux Reference Guide* to be more helpful.

For an overview of system administration, refer to the *Red Hat Enterprise Linux Introduction to System Administration*. If you are looking for information on system configuration, you may find the *Red Hat Enterprise Linux System Administration Guide* to be helpful.

If you are looking for information on securing your system, refer to the *Red Hat Enterprise Linux Security Guide*.

Do not forget to register for the benefits you are entitled to as a Red Hat customer. Registration enables access to the Red Hat Services you have purchased, such as technical support and Red Hat Network.

To register your product, go to:

`http://www.redhat.com/apps/activate/`

Appendix A.

# Removing Red Hat Enterprise Linux

To remove Red Hat Enterprise Linux from the S/390 you can either remove the DASD allocation from the VM or you can start the installation program and re-format all of the DASD partitions. Instead of selecting **OK** you will select **Cancel** to exit the installation program.

# Appendix B.
# Sample Parameter Files

Use the following samples as a guide to format proper parameter files.

Sample file with minimally required parameters:

```
root=/dev/ram0 DASD=200
```

**Note**

The Red Hat Enterprise Linux installation program prompts the user for any required parameters not specified in the parameter file.

Sample file configuring a CTC networking device:

```
DASD=200
HOSTNAME=client.z900.example.com NETTYPE=ctc IPADDR=192.168.0.10
CHANDEV=ctc0,0x150,0x151 NETWORK=192.168.0.0 NETMASK=255.255.255.0
SEARCHDNS=example.com:dns.example.com:z900.example.com
BROADCAST=192.168.5.255 GATEWAY=192.168.0.1 DNS=192.168.0.254
MTU=1492
```

Appendix C.

# Red Hat Linux to Red Hat Enterprise Linux Migration Solution

This appendix discusses how to migrate Red Hat Linux 7.1 to Red Hat Enterprise Linux 3 on the IBM zSeries and S/390 architectures.

If you currently use Red Hat Linux 7.2 for the IBM zSeries and S/390 architectures, upgrades via the installation program are not available. However, the following migration solution will assist you in moving to Red Hat Enterprise Linux.

First you must back up any existing data that you wish to keep for future use under Red Hat Enterprise Linux. Make sure to back up any necessary configuration files as well, such as the the configuration files from `/etc/`.

Once you have completed a backup of your data, you can reinstall the system using the instructions provided in this guide. Note that you may want to add additional space while partitioning to account for the new installation, future data, and any data that you intend to restore.

This recommended reinstallation method helps to ensure the best system stability possible.

Once the reinstallation has been completed, you can then begin to restore your data and any configuration files you may have backed up.

redhat

Appendix D.

# Troubleshooting Your Installation of Red Hat Enterprise Linux

This appendix discusses some common installation problems and their solutions.

## D.1. You are Unable to Boot Red Hat Enterprise Linux

### D.1.1. Is Your System Displaying Signal 11 Errors?

A signal 11 error, commonly know as a *segmentation fault*, means that the program accessed a memory location that was not assigned.

If you receive a fatal signal 11 error during your installation, it is probably due to a hardware error in memory on your system's bus. A hardware error in memory can be caused by problems in executables or with the system's hardware. Like other operating systems, Red Hat Enterprise Linux places its own demands on your system's hardware. Some of this hardware may not be able to meet those demands, even if they work properly under another OS.

Review if you have the latest installation and supplemental boot diskettes from Red Hat. Review the online errata to check if newer versions are available. If the latest images still fail, it may be due to a problem with your hardware.

## D.2. Trouble During the Installation

### D.2.1. `No devices found to install Red Hat Enterprise Linux` Error Message

If you receive an error message stating `No devices found to install Red Hat Enterprise Linux`, then there may be an issue with your DASD devices. If you encounter this error, add the `DASD=<`*`disks`*`>` parameter to your `parm` file (where *`disks`* is the DASD range reserved for installation), and start the install again.

Additionally, make sure that you format the DASDs using the `dasdfmt` command within a Linux root shell, instead of formatting the DASDs using CMS.

### D.2.2. Trouble with Partition Tables

If you receive an error after the **Disk Partitioning Setup** (Section 2.10 *Disk Partitioning Setup*) phase of the installation saying something similar to

**The partition table on device hda was unreadable. To create new partitions it must be initialized, causing the loss of ALL DATA on this drive.**

you may not have a partition table on that drive or the partition table on the drive may not be recognizable by the partitioning software used in the installation program.

No matter what type of installation you are performing, backups of the existing data on your systems should always be made.

### D.2.3. Other Partitioning Problems

If you are using **Disk Druid** to edit partitions, but cannot move to the next screen, you probably have not created all the partitions necessary for **Disk Druid**'s dependencies to be satisfied.

You must have the following partitions as a bare minimum:

- A / (root) partition
- A <swap> partition of type swap

**Tip**

When defining a partition's type as swap, you do not have to assign it a mount point. **Disk Druid** automatically assigns the mount point for you.

### D.2.4. Are You Seeing Python Errors?

During some upgrades or installations of Red Hat Enterprise Linux, the installation program (also known as **anaconda**) may fail with a Python or traceback error. This error may occur after the selection of individual packages or while trying to save the upgrade log in `/tmp/`. The error may look similar to:

```
Traceback (innermost last):
   File "/var/tmp/anaconda-7.1//usr/lib/anaconda/iw/progress_gui.py",
line 20, in run
     rc = self.todo.doInstall ()
   File "/var/tmp/anaconda-7.1//usr/lib/anaconda/todo.py", line 1468, in
doInstall
     self.fstab.savePartitions ()
   File "fstab.py", line 221, in savePartitions
     sys.exit(0)
 SystemExit: 0

 Local variables in innermost frame:
 self: <fstab.GuiFstab instance at 8446fe0>
 sys: <module 'sys' (built-in)>
 ToDo object:
 (itodo
 ToDo
 p1
 (dp2
 S'method'
 p3
 (iimage
 CdromInstallMethod
 p4
 (dp5
 S'progressWindow'
 p6

 <failed>
```

This error occurs in some systems where links to `/tmp/` are symbolic to other locations or have been changed since creation. These symbolic or changed links are invalid during the installation process, so the installation program cannot write information and fails.

If you experience such an error, first try to download any available errata for **anaconda**. Errata can be found at:

```
http://www.redhat.com/support/errata/
```

The **anaconda** website may also be a useful reference and can be found online at:

```
http://rhlinux.redhat.com/anaconda/
```

You can also search for bug reports related to this problem. To search Red Hat's bug tracking system, go to:

```
http://bugzilla.redhat.com/bugzilla/
```

Finally, if you are still facing problems related to this error, register your product and contact our support team. To register your product, go to:

```
http://www.redhat.com/apps/activate/
```

## D.3. Problems After Installation

### D.3.1. Problems with the X Window System (GUI)

If you are having trouble getting X (the X Window System) to start, you may not have installed it during your installation.

If you want X, you can either install the packages from the Red Hat Enterprise Linux CD-ROMs or perform an upgrade.

If you elect to upgrade, select the X Window System packages, and choose GNOME, KDE, or both, during the upgrade package selection process.

### D.3.2. Remote Graphical Desktops and XDMCP

If you have installed the X Window System and would like to log in to your Red Hat Enterprise Linux system using a graphical login manager, enable the *X Display Manager Control Protocol* (XDMCP). This protocol allows users to remotely log in to a desktop environment from any X Window System compatible client (such as a network-connected workstation or X terminal). To enable remote login using XDMCP, edit the following line in the `/etc/X11/gdm/gdm-config` file on the Red Hat Enterprise Linux system with a text editor such as `vi` or `nano`:

```
[xdmcp]

Enable=false
```

Edit the line to read **`Enable=true`**, save the file, and exit the text editor. Switch to runlevel 5 to start the X server:

```
/sbin/init 5
```

From the client machine, start remote X session using `X`. For example:

```
X :1 -query s390vm.example.com
```

The command connects to the remote X server via XDMCP (replace *s390vm.example.com* with the hostname of the remote X server) and displays the remote graphical login screen on display **:1** of the client system (usually accessible by using the [Ctrl]-[Alt]-[F8] key combination).

You may also access remote desktop sessions using a *nested* X server, which opens the remote desktop as a window in your current X session. `Xnest` allows users to open a remote desktop nested within their local X session. For example, run `Xnest` using the following command, replacing *s390vm.example.com* with the hostname of the remote X server:

```
Xnest :1 -query s390vm.example.com
```

### D.3.3. Problems When You Try to Log In

If you did not create a user account in the **Setup Agent**, log in as root and use the password you assigned to root.

If you cannot remember your root password, boot your system as `linux single`.

Once you have booted into single user mode and have access to the `#` prompt, you must type `passwd root`, which allows you to enter a new password for root. At this point you can type `shutdown -r now` to reboot the system with the new root password.

If you cannot remember your user account password, you must become root. To become root, type `su -` and enter your root password when prompted. Then, type `passwd <username>`. This allows you to enter a new password for the specified user account.

If the graphical login screen does not appear, check your hardware for compatibility issues. The *Hardware Compatibility List* can be found at:

```
http://hardware.redhat.com/hcl/
```

### D.3.4. Your Printer Will Not Work

If you are not sure how to set up your printer or are having trouble getting it to work properly, try using the **Printer Configuration Tool**.

Type the `redhat-config-printer` command at a shell prompt to launch the **Printer Configuration Tool**. If you are not root, it prompts you for the root password to continue.

### D.3.5. Apache-based `httpd` service/Sendmail Hangs During Startup

If you are having trouble with the Apache-based `httpd` service or Sendmail hanging at startup, make sure the following line is in the `/etc/hosts` file:

```
127.0.0.1  localhost.localdomain  localhost
```

redhat.

# Appendix E.

# Additional Boot Options

This appendix discusses additional boot and kernel boot options available for the Red Hat Enterprise Linux installation program.

Add these boot options to the parameter file. For more information, refer to Section 1.5 *Installing under VM*.

## Boot Time Command Arguments

`askmethod`

This command asks you to select the installation method you would like to use when booting from the Red Hat Enterprise Linux CD-ROM.

`dd`

This argument causes the installation program to prompt you to use a driver diskette.

`dd=`*`url`*

This argument causes the installation program to prompt you to use a driver image from a specified HTTP, FTP, or NFS network address.

`display=`*`IP`*`:0`

This command allows remote display forwarding. In this command, *`IP`* should be replaced with the IP address of the system on which you want the display to appear.

On the system you want the display to appear on, you must execute the command `xhost +`*`remotehostname`*, where *`remotehostname`* is the name of the host from which you are running the original display. Using the command `xhost +`*`remotehostname`* limits access to the remote display terminal and does not allow access from anyone or any system not specifically authorized for remote access.

`driverdisk`

This command performs the same function as the `dd` command and also prompts you to use a driver diskette during the installation of Red Hat Enterprise Linux.

`mediacheck`

This command gives you the option of testing the integrity of the install source (if an ISO-based method). This command works with the CD, DVD, hard drive ISO, and NFS ISO installation methods. Verifying that the ISO images are intact before you attempt an installation helps to avoid problems that are often encountered during an installation.

`mem=`*`xxx`*`M`

This command allows you to override the amount of memory the kernel detects for the machine. This may be needed for some older systems where only 16 MB is detected and for some new machines where the video card shares the video memory with the main memory. When executing this command, *`xxx`* should be replaced with the amount of memory in megabytes.

`nopass`

This command disables the passing of keyboard and mouse information to stage 2 of the installation program. It can be used to test keyboard and mouse configuration screens during stage 2 of the installation program when performing a network installation.

`nopcmcia`

This command ignores any PCMCIA controllers in system.

`noprobe`

This command disables hardware detection and instead prompts the user for hardware information.

`noshell`

This command disables shell access on virtual console 2 during an installation.

`nousb`

This command disables the loading of USB support during the installation. If the installation program tends to hang early in the process, this command may be helpful.

`nousbstorage`

This command disables the loading of the usbstorage module in the installation program's loader. It may help with device ordering on SCSI systems.

`rescue`

This command runs rescue mode. Refer to the *Red Hat Enterprise Linux System Administration Guide* for more information about rescue mode.

`resolution=`

Tells the installation program which video mode to run. It accepts any standard resolution, such as **`640x480`**, **`800x600`**, **`1024x768`**, and so on.

`serial`

This command turns on serial console support.

`text`

This command disables the graphical installation program and forces the installation program to run in text mode.

`updates`

This command prompts you to insert a floppy diskette containing updates (bug fixes). It is not needed if you are performing a network installation and have already placed the updates image contents in `RHupdates/` on the server.

`vnc`

This command allows you to install from a VNC server.

`vncpassword=`

This command sets the password used to connect to the VNC server.

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# Colophon

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